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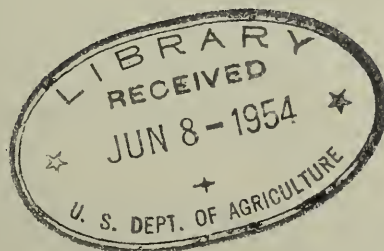
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SOIL SAMPLING EQUIPMENT CARRIER AND IMPROVED SAMPLING PROCEDURES

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FOREWORD

One of the most strenuous parts of irrigation research work is obtaining soil samples for moisture determinations. Although much time and effort has been expended to develop easier methods of obtaining such information, the problem is still not solved insofar as large scale field studies are concerned. It is still necessary to obtain soil samples and make moisture determinations by standard procedures which have been in use for many years.

Since obtaining samples for soil moisture determinations requires so much time and effort, it would appear that there may be certain equipment and procedures which can be developed to reduce this effort to a minimum. From the field experience of the author during the past 5 years, an equipment carrier and sampling procedure has been developed which decreases the cost of taking soil samples by half.

DISCUSSION OF EQUIPMENT

In connection with the irrigation investigations in the Malheur area of eastern Oregon, it is necessary to take a large number of soil moisture samples. Over five thousand individual samples are required annually. Therefore, any saving of time in a single step of the sampling procedure amounts to a considerable amount of time saved during a season.

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Early in the 1952 season, an equipment carrier was designed and constructed which greatly reduced the man-hours of time required to take soil moisture samples on this project.

Any equipment carrier to be fully useful under conditions found in eastern Oregon must meet the following specifications:

1. It must be sufficiently high to clear the crops growing in the fields to be sampled.
2. It must be able to cross furrows and corrugates.
3. It must conveniently transport all necessary equipment and soil samples.
4. It must be light and compact for easy loading and carrying in a sedan delivery or pickup truck.

A small garden type wheelbarrow with a pneumatic tire was first tried out for this purpose. However, the small wheel made it very difficult to push across the corrugations and soft ground when loaded with sampling equipment. Also, the standard bed was not flat and did not provide a good platform on which the operator could lay his equipment during the sampling process. In using the wheelbarrow all of the equipment had to be removed from the bed and laid on the ground at each sampling site. The standard wheelbarrow was therefore redesigned as shown in figure 1.

Soil sampling equipment which must be carried into the fields of eastern Oregon are:

1. Five-foot King soil tube
2. Soil tube jack
3. 42-pound driving hammer
4. Cans for soil samples
5. Forms for recording sampling data

The loaded carrier is shown in figure 2.



Side View



Top View

Figure 1 - Soil moisture sampling equipment carrier constructed by remodeling a light garden type wheelbarrow. A standard 27 inch bicycle wheel was substituted for the wheelbarrow wheel. The platform was made from 3/4 inch plywood and substituted for the wheelbarrow pan. The legs were lengthened by welding on extensions. (It may be cheaper to purchase the material and make the carrier to about the same dimensions, rather than to convert from a wheelbarrow.)

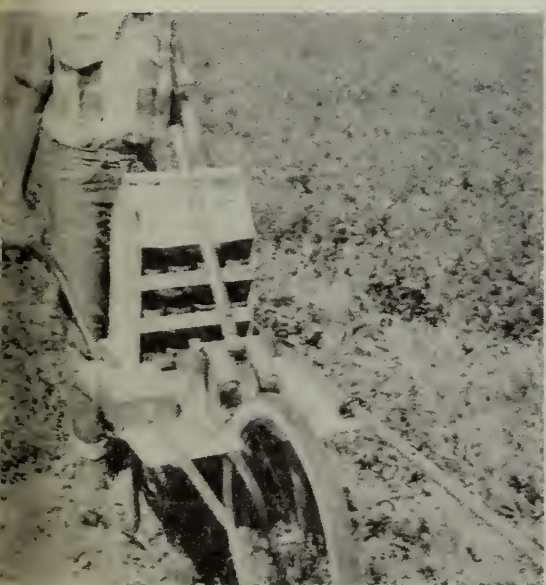


Figure 2 - Loaded equipment carrier ready to be wheeled to the sampling site (A five-foot King soils tube is secured to one side of the platform by two screen door catches. In the center of the platform, straddling the wheel is the soil tube jack. On the other side of the platform is the driving hammer, with the guiding end forward. A portable metal can carrier is at the rear of the platform. The top of the can carrier furnishes a writing surface. An attached clip holds the recording sheet in place on this surface. All of the equipment is held in position on the platform by large screws around the edges.)

On the Owyhee project lands in eastern Oregon it is usually necessary to use a 42-pound hammer and jack in sampling. This sampling method and the use of this equipment and the special procedures developed here save at least fifty percent of the time formerly required by using the conventional methods of placing the cans in sacks or boxes and carrying the equipment by hand through the field. Carrying by hand usually requires more than one trip between sampling stations or the assistance of another man. By using the procedures and equipment described in this report it is estimated that not less than 58 man-days of work is saved annually in carrying out the research program in eastern Oregon.

Another factor of importance is that the operator does not have to continuously bend over while removing the soil from the tube. This lessens, to a considerable degree, the drudgery of the soil sampling work. The use of a suitable equipment carrier which is easily pushed through the field further lessens the drudgery of this difficult work. Experience indicates that the use of this equipment and procedure tends to increase the operator's interest in the job which is conducive to more accurate work.

The use of the equipment is illustrated in figures 3 to 12.



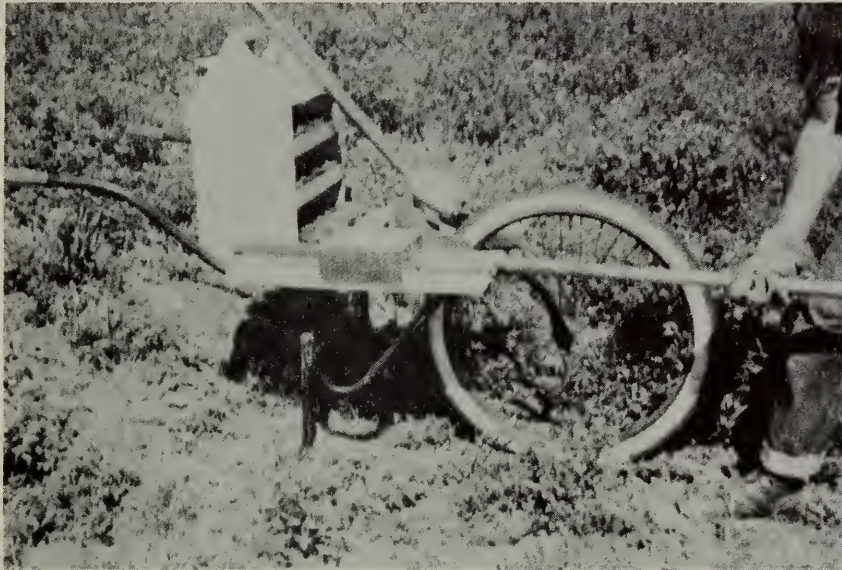


Figure 3 - Equipment carrier at sampling site. Driving hammer is being inserted into soil tube.

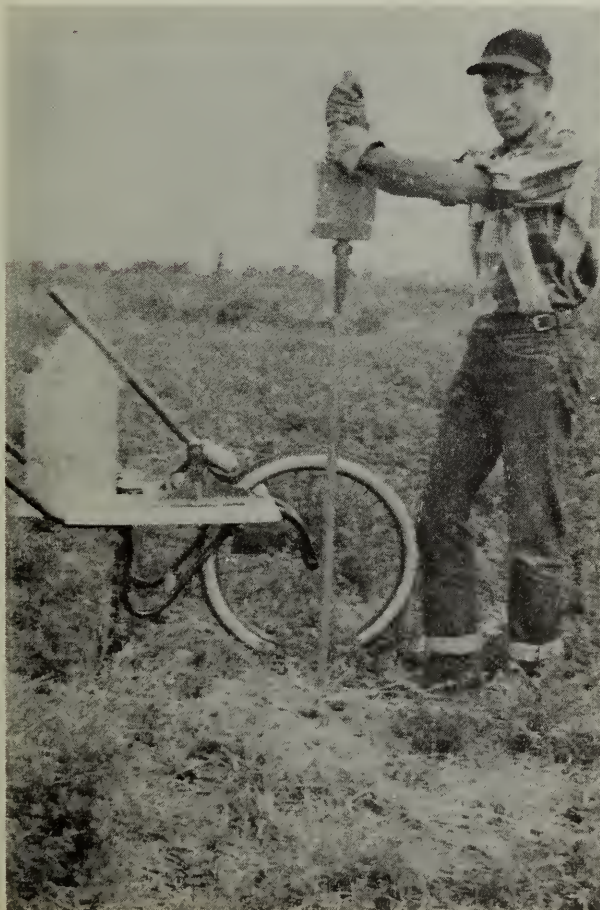
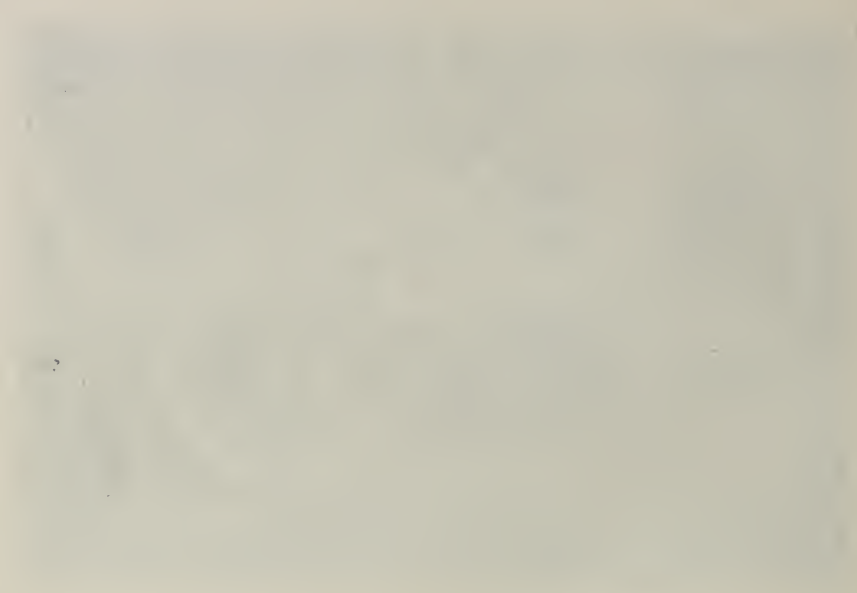


Figure 4 - Soil tube and hammer in position for driving.





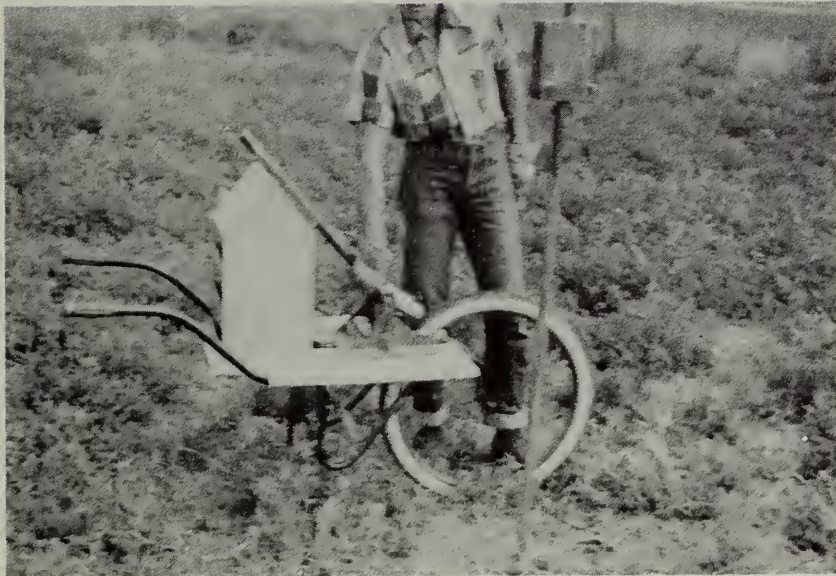


Figure 5 - Reaching for the jack to pull the loaded soil tube.



Figure 6 - Removing the hammer from the tube prior to pulling the loaded soil tube. The hammer is then placed directly in front of the cans.





Figure 7 - Pulling the loaded soil tube with the jack.

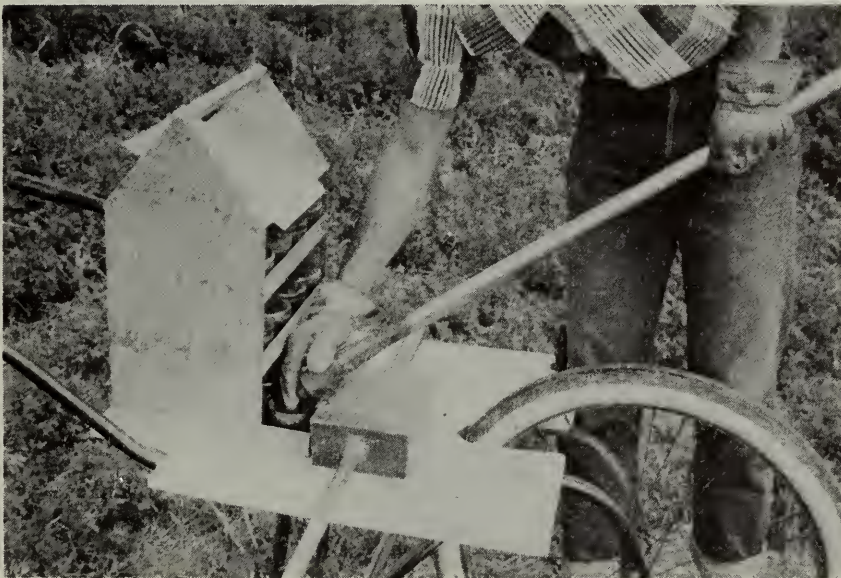


Figure 8 - Dumping the soil sample into the cans. The tube is tapped lightly against the hammer if necessary to dislodge the soil core.



Figure 9 - Recording the sampling information. Note that the soil tube is on the hammer and ready for obtaining the next sample.

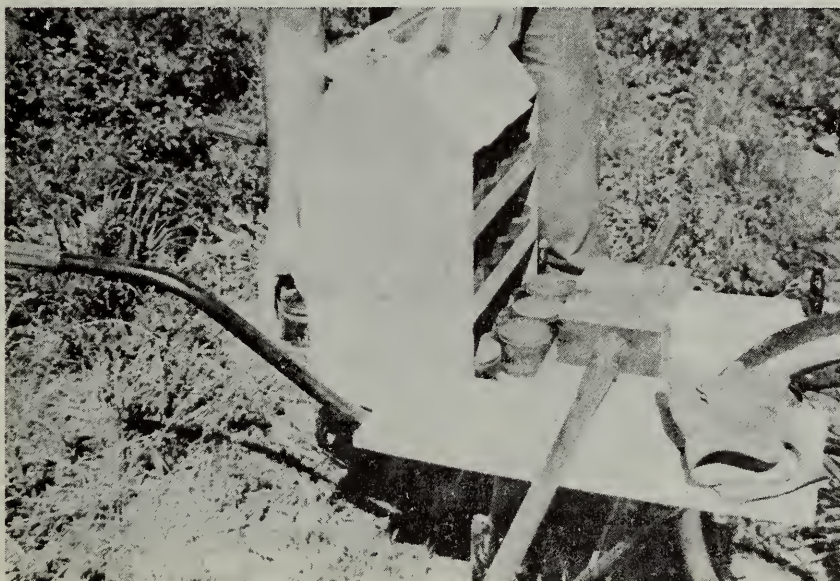


Figure 10 - The loaded can is placed in the back of the carrier and pushed an empty into position for filling.



Figure 11 - The can carrier is portable and can be conveniently used where the wheel equipment will not go. The soil tube has been inserted into the hammer guide and the assembly is carried on his shoulder.

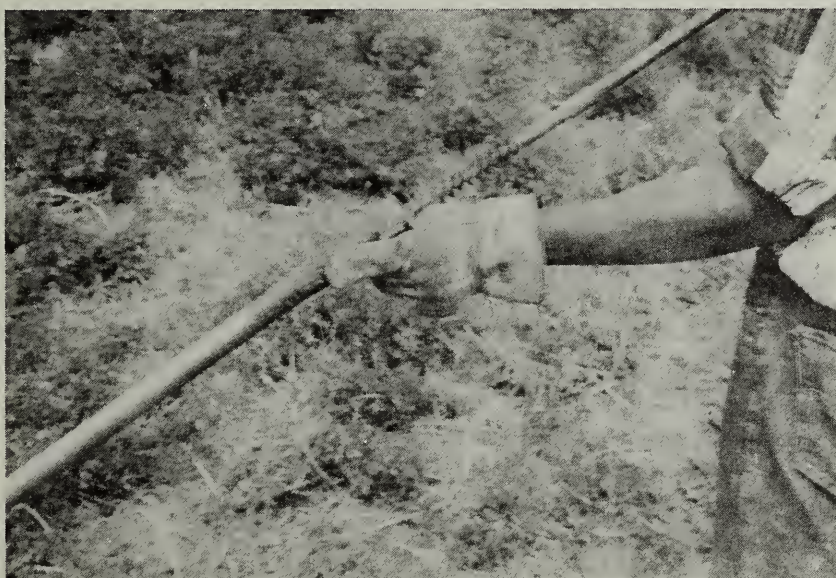


Figure 12 - Cleaning the inside of the sampling tube with a steel brush. (A very important operation in soil moisture sampling is cleaning the tube. The tube must be clean at all times to secure an accurate soil sample. A $1\frac{1}{4}$ inch boiler flue brush screwed onto the end of a $\frac{3}{8}$ inch pipe is a very good cleaner. In figure 12 the operator is inserting the brush into the tube. The first and last operation in soil sampling should be to always clean the tube both before and after sampling.)

